The orbit of the sun around the earth according to Vedic cosmology

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We learn in school that the appearance of days and nights comes due to the movement of the earth around the sun (revolution), and the rotation of the earth in its axis (rotation). This explanation is used to make models that explain in detail the passage of days and nights as well as the seasons. True or not, such models work.

When we study the 5th canto of Srimad Bhagavatam, hearing about the features of Bhu-mandala and the movements of the sun around it, we may get the idea that the model of the cosmos explained in the Vedas doesn't offer a working model for the movement of the sun. If the earth is part of Bhu-mandala, which is a flat structure, then the sun should be circling overhead once per year, and there would be constant daylight. When we look into the sky and realize this is not what happens, we may think that the whole model is wrong or incomplete and that the Vedas don't have an explanation for the passage of days and nights. This idea is incorrect.

The 5th canto offers a working model for the movements of the sun that perfectly explain the days and nights, as well as the passage of the seasons. It is very clearly described, it is just that it is very difficult to understand since it is mixed with other information.

Understanding this point is especially important now that we are building the presentations for the ToVP that will show how this model works for

great audiences. If we fail to show this point, people will not take the model seriously.

How does it work?

At first, it appears that the Srimad Bhagavatam describes that the sun goes around Bhu-Mandala in a fixed orbit, once per year. Accepting that our planet is part of Bhu-Mandala, being situated somewhere on the outskirts of Jambudvipa, how can we explain the passages of days and nights?

The point is that the movement of the sun around Bhu-Mandala is much more complicated than it may seem at first. We need to be very attentive to understand how the sun circles Bhu-Mandala and how these movements result in the passage of days and nights as well as the seasons.

One axle of the sun is fixed on Mount Sumeru and Manasottara Mountain. This is the horizontal axle that makes the sun circumambulate Bhu-Mandala once per year in a counter-clockwise direction.

Since Mount Sumeru is higher, the axle is sustained on the other side by a gigantic wheel that revolves on top of Manasottara Mountain, a gigantic ring-shaped mountain. The axle itself, as well as other features of Bhu-Mandala, are not visible to us, but we can experience the practical result of this motion as the annual movement of the sun.

One may be quick to point out that this explanation does not explain the passage of days and nights, nor does it properly explain the passage of the seasons and the variation of the length of the days and nights as the year passes. If the Earth would be flat, we would see the sun circling around and it would never be night. If we accept the Earth as a sphere situated close to tOne axle of the sun is fixed on Mount Sumeru and Manasottara Mountain. This is the horizontal axle that makes the sun circumambulate Bhu-Mandala once per year in a counter-clockwise direction.

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One may be quick to point out that this explanation does not explain the passage of days and nights, nor does it properly explain the passage of the seasons and the variation of the length of the days and nights as the year passes. If the Earth would be flat, we would see the sun circling around and it would never be night. If we accept the Earth as a sphere situated close to the center of Bhu-Mandala, this model would result in a very long day that would take a whole year to be completed, with 6 months of sun and 6 months of darkness. This is because the orbit of the sun around Bhu-Mandala is not the complete model. There is more.

SB 5.21.14 describes that the sun has also a vertical axle, which is fixed in Dhruvaloka:

“As in an oil-pressing machine, this first axle is attached to a second axle, which is one-fourth as long [3,937,500 yojanas, or 31,500,000 miles]. The upper end of this second axle is attached to Dhruvaloka by a rope of wind.”

The vertical axle connected to Druvaloka makes the sun rotate in a clockwise direction, while the horizontal axle fixed on Mount Sumeru is responsible for a counterclockwise motion. So, in one sense, the sun travels around Druvaloka, maintaining both Druvaloka and Mount Sumeru on its right, and in another sense it travels around Mount Sumeru, facing the constellations of the Zodiac and keeping both Mount Sumeru and Druvaloka to its left.

At first, this idea sounds contradictory, if not absurd. How can the sun move simultaneously in both directions? This apparent contradiction was caught by Maharaja Pariksit, who asked a timely question:

"My dear lord, you have already affirmed the truth that the supremely powerful sun-god travels around Dhruvaloka with both Dhruvaloka and Mount Sumeru on his right. Yet at the same time the sun-god faces the signs of the zodiac and keeps Sumeru and Dhruvaloka on his left. How can we reasonably accept that the sun-god proceeds with Sumeru and Dhruvaloka on both his left and right simultaneously?” (SB 5.22.1)

Srila Prabhupada didn’t comment on these verses on Srimad Bhagavatam, but he gave the answer later when he was discussing the structure of the universe with his disciples with the purpose of creating the universal model of the universe for the temple of the Vedic Planetarium. At that time he explained:

“This planetary system is rotating from east to west, and it is hanging like the chandelier, taking shelter of the polestar. That we can see every night.

Now where is the situation, which planet, where is sun, where is moon—so that he has to assert." (March 2-3, 1977, Mayapur)

Another similar explanation was given in a letter to Svarupa Damodara Maharaja (April 27, 1976):

"My final decision is that the universe is just like a tree, with root upwards. Just as a tree has branches and leaves so the universe is also composed of planets which are fixed up in the tree like the leaves, flowers, fruits, etc. of the tree. The pivot is the pole star, and the whole tree is rotating on this pivot. Mount Sumeru is the center, trunk, and is like a steep hill… The tree is turning and therefore, all the branches and leaves turn with the tree. The planets have their fixed orbits, but still they are turning with the turning of the great tree… Distances are also described in the 5th Canto just how far one planet is from another. We can see that at night, how the whole planetary system is turning around, the pole star being the pivot. Each planet has its orbit fixed but the sun is moving up and down, north and south."

In modern cosmology, the days and nights and the passage of the seasons are explained by the rotation of the earth combined with the annual orbit of our planet around the sun. This explanation is based on a heliocentric model of the universe.

Vedic Cosmology, on the other hand, is based on a geocentric model, where the earth is fixed in space, as part of Bhu-Mandala. In this model, the sun, as well as the stars and planets, move around the whole structure.

Srila Prabhupada uses the example of a chandelier that rotates. We can imagine all the stars and planets as components of a gigantic chandelier. All the parts of this cosmic chandelier are kept together by ropes of subtle wind.

As the whole chandelier rotates, all the parts move together as part of the chandelier, but at the same time, each part has its own motion relative to the other parts. The combination of both motions when observed from our planet result in the movements of the sun, planets, and stars that we see when we look into the sky.

We can imagine something like many particles of dust caught in a whirlwind. All the particles are moving with the whirlwind, but at the same time, each particle is moving independently in relation to the others. In other words, all the particles are moving in relation to the ground, following the general flow of the wind, but each particle moves in a subtly different way and thus the particles also move in relation to each other.

In this model, the sun circles around our planet every 24 hours, following the rotation of the whole sky. This is its clockwise rotation around Druvaloka, connected with the vertical axis. However, there is also the counterclockwise rotation around Mount Sumeru, which takes one full year to complete. This second movement is connected with the horizontal axis connected to Mount Sumeru.

The inhabitants of Bhu-mandala live on a flat surface. As a result, for them, the sun is always overhead. Because the sun is always circling their

plane, they never experience complete darkness. Due to the rotation of the sun around Druvaloka, there is some variation in the amount of light received, which they perceive as the passing of days and nights, and at the same time, the annual movement of the sun around Mount Sumeru results in additional variations they perceive as the passage of the seasons.

For the demigods, things work differently. Because their planets are also circling around Druvaloka as part of the universal chandelier (in other words, because they are moving alongside the sun around Druvaloka), the only movement of the sun noticed by them is the annual counterclockwise rotation of the sun around Mount Sumeru. They perceive this space of time (which is one year for us) as a very long day, during which they have the opportunity to enjoy the heavenly delights that surround them.

When we come down to our plane, things again work differently. Because our planet in the gross dimension is a globe, only half of the planet receives direct light from the sun at a time and we have a clear distinction between days and nights. This is confirmed on SB 5.21.9: “People living in countries at points diametrically opposite to where the sun is first seen rising will see the sun setting, and if a straight line were drawn from a point where the sun is at midday, the people in countries at the opposite end of the line would be experiencing midnight. Similarly, if people residing where the sun is setting where to go to countries diametrically opposite, they would not see the sun in the same condition.”

The cycles of days and nights described in this verse are connected with the clockwise rotation of the sun (when it orbits around Druvaloka). This makes the sun rise in the east and set in the west every 24 hours, resulting in the passages of our days and nights.

At the same time, there is the counterclockwise rotation of the sun around Mount Sumeru that takes one year to complete. It happens that because our planet is tilted, this movement is perceived as the sun going from south to north and then from north to south as the year passes, following the line of the ecliptic. This movement results in the passage of the seasons. It works quite similarly to what is believed in modern cosmology, but the model works from a geocentric perspective, with the earth fixed and the sun and other luminaries moving around it.

This is explained in SB 5.21.3-6, where is stated:

“While passing toward the north, toward the south or through the equator, in accordance with the order of the Supreme Personality of Godhead, it is said to move slowly, swiftly or moderately. According to its movements in rising above, going beneath or passing through the equator — and correspondingly coming in touch with various signs of the zodiac, headed by Makara [Capricorn] — days and nights are short, long or equal to one another.

When the sun passes through Mesa [Aries] and Tula [Libra], the durations of day and night are equal. When it passes through the five signs headed by Vrsabha [Taurus], the duration of the days increases [until Cancer], and then it gradually decreases by half an hour each month, until day and night again become equal [in Libra].

When the sun passes through the five signs beginning with Vrscika [Scorpio], the duration of the days decreases [until Capricorn], and then gradually it increases month after month, until day and night become equal [in Aries].

Until the sun travels to the south the days grow longer, and until it travels to the north the nights grow longer.” (SB 5.21.3-6)

In other words, the daily rotation of the sun around Druvaloka makes it circle around our planet, resulting in the passage of days and nights, and the annual rotation of the sun around Mount Sumeru is perceived on our planet as it gradually going up and down, moving from north to south and from south to north, and passing through the different signs of the zodiac. This vertical movement explains the passing of the seasons.

There is an illustration attached to the topic that can help to better understand this concept:

As previously mentioned, our planet is tilted in relation to Bhu-Mandala. As a result, the sun doesn’t circle the planet around the equator, but on a slightly different path that we call the ecliptic. We can see that this path corresponds to the path of the sun around Bhu-Mandala.

The daily rotation of the sun happens around the path of the equator, while the annual movement of the sun happens on the path of the ecliptic. Because of this difference, we see the sun rising in the east and setting in the west every day (the daily rotation around the equator) and we see the sun gradually moving from north to south, or south to north as the days pass, resulting in the passage of the seasons and the variations in the length of days and nights. These two movements go on simultaneously.

Other visible planets also have a daily rotation around Druvaloka, as part of the universal chandelier, and at the same time have their own independent orbits relative to the sun and to each other. The combination of both movements results in the motions we can observe when we look into the sky. Similarly, different stars also appear to be moving in the sky due to different particularities of their own orbits.

In Srimad Bhagavatam, Srila Sukadeva Goswami uses the example of ants moving in a potter's wheel. A potter's well is always rotating in the same direction, but ants on top of it may move simultaneously in different directions, and in this way, the ants simultaneously move alongside the wheel and follow their own motions relative to each other. As a result, they will appear sometimes on one part of the wheel and sometimes on another. One who is observing the scene would see that the ants rotating with the wheel would sometimes appear closer to the outer extremity and sometimes closer to the inner axle, or appear to be closer or more distant from each other.

If we would slightly tilt the wheel, we would see the ants sometimes more to the south and sometimes more to the north, as they continuously rotate with the wheel and simultaneously go on with their independent movements. There is also an illustration of a potter's wheel attached to this post that may help you visualize the concept.

Accepting that our planet is a sphere and it is tilted in relation to Bhu-Mandala (which corresponds to the line of the ecliptic), from our point of

view the annual movement of the sun is almost exactly on the same perspective as the potter's wheel in the photo. As the sun moves around mount Sumeru, it actually goes to the north or to the south according to our perspective, and this results in the sun appearing higher or lower in the sky and the days becoming longer or shorter. This movement is described in SB 5.21.3-6 that I quoted earlier.

It's important to also consider that in the gross dimension we live, Mount Sumeru as well as the rest of Bhu-Mandala is not visible, therefore it doesn't block the passage of the light in any way, just like the rest of Bhu-Mandala. All we can see in our dimension is the sun circling around, illuminating the two halves of the planet at different times, and gradually moving to the north or to the south with the passage of the seasons.

When we take things in this perspective, we can see that the model of the universe given in the 5th canto Srimad Bhagavatam explains both how the universe is experienced by the demigods and how it's experienced in our gross dimension. However, because both explanations are given simultaneously, it appears that different verses are describing two different models that are contradictory to each other, while actually these are just different features of the same multidimensional model.

When we take things under this perspective we can see that the 5th canto of Srimad Bhagavatam actually harmonizes the models of the universe from the Puranas (which describe the subtle dimension of the demigods) and the model of the Surya Siddhanta (which describes our gross dimension). It appears that actually both models are not contradictory, but the explanation of how exactly they fit together was lost with the passage of the centuries. The 5th canto of Srimad Bhagavatam gives thus some insight of how they fit together.

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